

Deliverable D 5.02.4

Possible installation of biomass heating system

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Organizations name of lead contractor for this deliverable: Gmina Słubice/Poland.

Author : Waldemar Buchta

Urząd Miejski SŁUBICE / POLAND

Ul. Akademicka 1

Tel: +48 957372062

Fax: +48 957372018

sems@slubice.pl



Installation of a biomass heating system

A biomass heating system in one of Słubice`s public buildings has been foreseen within the framework of the work package no. 5.02. The building should also be a subject of thermal refurbishment.

As a result of an analysis of needs and possibilities for the commune a primary school building along with its boiler room in Kunowice, Słubicka Street 18 has been chosen for the above mentioned task.

The school is situated in an old building which was built in the 1920s. It is built in traditional architecture style, has a stone foundations and gable roof covered with clay tile. The attic is partly used; while the peak of the roof does not have thermal insulation.

The commune of Słubice commissioned an energy audit in order to carry out the assignment. Authorized auditors (Janusz Szymczyk, Gorzów Wlkp.) delivered the results of the audit which was done on the 14th September 2009.

Building description according to audit report

Number of storeys: 2 + cellar

Cubature: 1755 m³

Net building area: 498 m²

Heated area: 436 m²

Number of pupils: 85

Number of rooms: 10

Heating system: traditional hard coal-burning oven, poor technical condition with low efficiency.

Heating systems in rooms: hydro-heaters

Domestic hot water heating: 60l electric boiler

Kind of ventilation: natural



Energy parameters of the building:

Parameter	Before thermal renovation	After thermal renovation
Heat transfer coefficient – walls U (W/m ² .K)	1.151	0.216
Heat transfer coefficient – roof U	1.080	0.80
Heat Power of heating system kW	36,5 kW	20,7 (38,0*)
Annual heat demand necessary to heat the building (GJ/a)	230,3 GJ/a	58,7 GJ/a (230,0 GJ/a*)
Annual heat demand necessary to heat domestic water	47,9 GJ/a	47,9 GJ/a
Annual heat demand necessary to heat the building kWh/m ² /a	128,63 kWh/m ² /a	32,81 kWh/m ² /a
Decrease in demand for thermal energy (%)		61,7 %

*in the middle of preparation for thermal renovation the authorities of the commune decided to build a small gym in the future. Energy needs of this object have been taken into consideration by drawing up a plan of rebuilding a boiler room.

To achieve the improvement of the energy parameters of the building and to save thermal energy the audit report shows the following catalogue of measures:

- Implementation of insulation und refurbishment measures as described in D 5.02.3 in detail
- supporting the heating of domestic water by using solar heating systems (this solution is disadvantageous because of the long summer holiday break) or air heat pumps
- Improvement of heating efficiency by installation of biomass heating system (wood pellets) with weather automatics, clearing out radiators and installation of radiator reflectors.



Before the building heating system was replaced the energy audits showed an unfavourable energy balance, not only because of the small energy efficiency of the former coal heating system. The consumption of hard coal as the basic fuel was around 11,5 – 12,0 t / year (assuming that 1 t of coal equals 20 GJ of thermal energy). The heating costs summed up to 9.200,00 to 10.500,00 PLN for solid fuel and boiler service costs of around 18.000 PLN each year. The renovation of the building and a change to pellet heating system contributed to cost savings. The estimated costs of pellets – assuming that the use of pellets will be around 3,0 to 5,0 tonnes a year – will sum up to 4.000,00-5.000,00 PLN and the boiler service costs will be reduced to 9.000 PLN per year. The savings in heating costs will be around 14.000,00 PLN a year. Free Heat power of a boiler will be outwardly used to heat the gym which will be built in 2012-2013.

The heating system was replaced in December 2011 by an authorized local installation company named WARBAN. A 38 kW container boiler with automatic fuel feeder was installed (by taking into consideration the heating needs of a planned gym).

“ARISTON” air heat pump “NUOS” (left) and “Kotłobud” biomass heating boiler, type: KWM-SP (right)



Boiler-room before the installation of a new boiler:



Boiler-room after installation of a new boiler:



Boiler specifications:



Reserve of wood pellets:

